

### Abstract

10 A framework for managing approximate models in generation-based evolution control is proposed. This framework is well suited for parallel evolutionary optimization that is able to guarantee the correct convergence of the evolutionary algorithm and to reduce the computation costs as much as possible. Control of the evolution and updating of the approximate models are based on the estimated fidelity of the approximate model. The frequency at which the original function is called and the approximate model is updated  
15 is determined by the local fidelity of the approximate model. By local fidelity the fidelity of the model for the region where the current population is located is designated. The lower the model fidelity is, the more frequently the original function should be called and the approximate models should be updated.